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AUTOMATIC EMERGENCY SERVICE SYSTEM WITH QR- CODE

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Abstract — *Longer response time required for emergency responders to arrive is a primary reason behind increased fatalities in serious accidents. One way to reduce this response time is to reduce the amount of time it takes to report an accident. Smart phones are ubiquitous and with network connectivity, they are perfect devices to immediately inform relevant authorities about the occurrence of an accident.*
The paper aims at designing an Android application which will be beneficial for people to help themselves as well as other people who are suffering from incident like accident. It will help us to save the accidental person. The application informs the police control room about the accident by clicking photo of accident. The application suggests nearby hospitals and police stations list. FIR is generated by police station and a copy is sent to the respected hospital system. Respected hospital scans user QR-Code and provide treatment accordingly and also sends an emergency SMS to users preregistered mobile number.

Keywords- *GPS(Global Positioning System), QR-Code(Quick Response Code), AES, Haversine Formula, K-nn algorithm.*

I. INTRODUCTION

The rapid development of people's living standards and economic development continues to improve. As well as there is a huge loss of life and property due to increased road accidents. Now a days we often come across the fact that when an accident occurs the people nearby have to manually call the ambulance which leads to waste of time. Hence there is a delay for the emergency services to arrive at the location of the accident.

Now a days, advances in Android are one of the most popular smart phone platforms at the moment, and the popularity is even rising. In addition to this, it is one of the most open and flexible platforms providing software developers easy access to phone hardware and rich software API. Using smart phone technologies are making it possible to minimize the death rate which are happening due to vehicle accidents in a more efficient and cost effective manner than conventional in-vehicle solutions.
The system incorporates the use of inbuilt sensors of smart phones to detect accident and take the actions accordingly. A microcontroller is used to control the GPS and GSM modules [1]. To track vehicle, system uses the GPS to get geographic coordinates at regular time intervals. GPS module uses various algorithm like Haversine to know the latitude and longitude [2]. The GSM is used to transmit and update the vehicle location to a database. The Google Maps API is used to identify the location of the vehicle [1]. It provides a two way communication by using a sim card.
A QR (Quick Response) code is a type of barcode that can store more data than the familiar kind scanned at checkouts around the country [8]. It is a reference to the speed at which the large amounts of information they contain can be decoded by scanners.

II. RELATED WORK

K. Shah and S. Bairagi [1], had introduced the use of Arduino Uno, alcohol and piezoelectric sensors to detect accident. It incorporates the use of an embedded system that contains GPS and GSM modules connected with an Arduino UNO. Through GSM, the exact location or position of the vehicle is determined in the form of latitude and longitude. The GPS module used is NEO-6mv2. It gives high performance, flexibility and cost effective receivers.

C. Vidya Lakshmi and J.R.Balakrishnan [2], had introduced the use of an automatic alarm device for traffic accidents. It makes use of a of large-range dual-axis accelerometer MMA621010EG and small-scale three-axis accelerometer sensor MMA7260QT for information detection. It can automatically find a traffic accident, search for the spot and then send the basic information to first aid centre within two seconds covering geographical coordinates, the time and circumstances in which a traffic accident takes place.
Chris Thompson, Jules White, Brian Dougherty, Adam Albright, and Douglas C. Schmidt [3], focused on the study of smart phone based wireless mobile sensor networks as accident detection systems. It discusses the issues related to the development of software designed to detect collision is the lack of integration between vehicle and smart phones. It describe solutions to key issues associated with detecting traffic accidents. The paper shows how smart phones in a

wireless mobile sensor network can capture the streams of data provided by their compasses, accelerometers, and GPS sensors to provide a portable black box that detects accidents and records data related to accident events.

M Rajendra Prasad, P Aswani Kumar [4], had the main focus on to provide security to the vehicle in a very reasonable cost so in this work the basic microcontroller AT89C51 is used for cost effective and also for easy understanding. The purpose of the work is to find where the vehicle is and also can stop the vehicle i.e after sending a block message, the vehicle will get down there itself, until and unless the authorized person comes and gives the security code to that system.

J. White, C. Thompson, H. Turner, B. Dougherty and D. Schmidt [5], had introduced an approach to eliminate the delay between accident occurrence and first responder dispatch. It is to use in-vehicle automatic accident detection and notification systems, which sense when traffic accidents occur and immediately notify emergency personnel. It describes how smart phones, such as the Google Android platforms and iPhone, can automatically detect traffic accidents using acoustic data and accelerometers, immediately notify a central emergency dispatch server after an accident.

Ankita S. Nampalliwar, Asst. Prof. Sheeja S. Suresh [6], had done the research on the use of AES algorithm for the encryption process. It is a symmetric block cipher chosen to protect classified information and is implemented in software and hardware throughout the world to encrypt sensitive data. It is a block cipher which operates on block size of 128 bits for both encrypting as well as decrypting. The results shows that it is fastest algorithm for encryption and decryption process and provides better security as it uses a single key for the process.

Prof. Nitin R.Chopde, Mr. Mangesh K. Nichat [7], introduced an idea on the generic scheme for navigating a route through out city is created. The main aim of the paper is to find the route between two placed within a city mentioned by user using the junctions between the source and destination junction. The idea behind this is to provide the better navigation of the user within the city. The paper suggests the use of A* algorithm over the Dijkestra algorithm as it is a combination of Dijkestra and BFS algorithm which gives a faster response.

Ajini Asok, Arun G [8], had discussed how QR-code can play a significant role in mobile applications due to their beneficial properties. It can store a large amount of data and acquires the capability of correcting errors. It is highly used for security-sensitive purpose including payments and personal identification as it cannot be decoded easily. Any information on a cell phone can be transmitted to a second cell phone as QR code displayed on the LCD which is then captured using camera of second phone and can be decoded there.

Jorge Zaldiva, Carlos T. Calafate [9], had focused on an Android based application that monitors the vehicle through an On Board Diagnostics (OBD-II) interface, being able to detect accidents is proposed. The application estimates the G force experienced by the passengers in case of a frontal collision, which is used together with airbag triggers to detect accidents.

Hamid M. Ali, Zainab S. Alwan [10], had done a research that most of the smart phone based accident detection systems rely on the high speed of the vehicle and the G-Force value to detect an accident. Here, in addition to the high speed accident detection, this paper concentrated on low speed car accident detection. The proposed system consists of different phases as the detection phase which is used to detect car accident in low and high speeds.

Pushkar, Mrs. Dhanashree A. Phalke, Anshika, Anuradha Bharti, Ruchika Jagnani [11], had done a survey on the use of an automated emergency service system. They have introduced the efficient use of the algorithms like k-nn and AES in their system to serve the injured person as early as possible. The research shows that the smart phone applications are quickly able to provide the services in case of an accident. Android applications have much scope in the coming future.

III. EXISTING SYSTEM

As the existing system is totally manual and user needs to call police station and hospital individually at the time of an accident. There is no such co-operation between police station and hospital in order to provide services to the injured person. Firstly the police station needs to register the FIR and until and unless it finishes its process, hospital can't proceed further. There doesn't exists any automation system for the accident. Apart from the manual system, there exists a lot of hardware based systems which doesn't incorporate the collaborative working of hospital and police station. Also the work done is based on the emergency calling to the preregistered number and to the hospital but not to the police station.

3.1. Disadvantages of existing system

1. It requires lengthy paper work process.
2. There is a need of collaborative working of police station and hospital.

IV. PROPOSED SYSTEM

Proposed system collects user information at the time of user registration with our system in case of an accident and generate QR code for individual. After an accident, users can take a picture of the accident spot and sends it to the nearest police station recommended by the system along with the location information and simultaneously informs the nearest hospital. After police station services the request, the system can automatically generate the FIR along with accident image and sends a copy to the hospital. Hospital can send a feedback to the user and after reaching to the accident location any individual can scan the user's QR code to get the user information instantly and can provide treatment to the user.

4.1. Advantages of proposed system

1. Instant recommendation of nearby police station and hospital at the time of accident.
2. Required time is reduced in providing treatment to the user.
3. Informs to the police station at the earliest time possible to proceed with its procedures.
4. Time in reduced in personally identifying the hospitals.
3. Reduction of paper work.

V. ARCHITECTURE OVERVIEW

QR-Code is generated at the time of user registration and all the information is stored at the database. User captures the picture and search the nearest police station and hospital. After requesting for the nearest police station, the request is accessed and FIR is generated by police station. Police station sends a copy of the generated FIR to the hospital. Hospital scans the QR-code and all the required information is acquired and the injured person is provided treatment with minimal time delay.

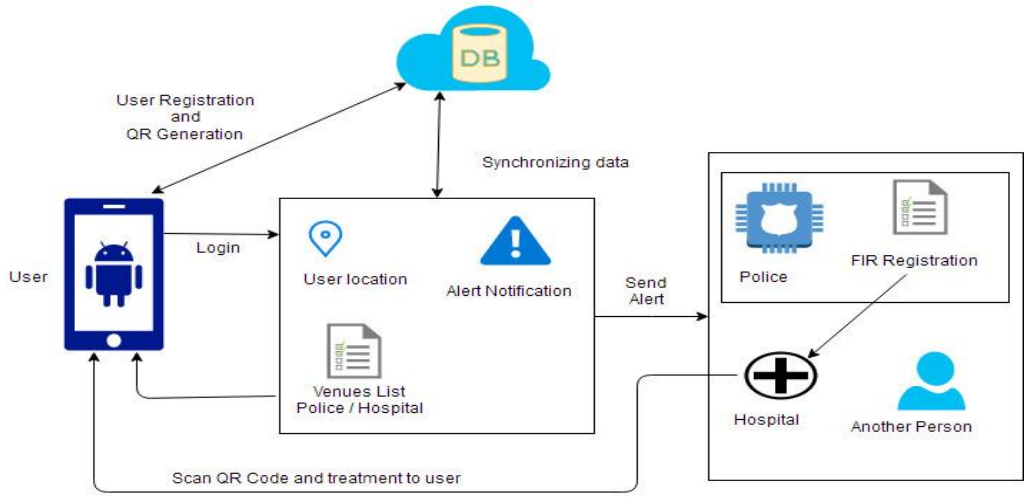

Figure 1. System architecture

5.1. Modules

5.1.1. User

The person who met with an accident as well as the third person i.e. who do not have the application can access this system by simply pressing the button. Further he/she is provided with the details of nearby police station and hospital.

The associated algorithm used in this module is the K-nn algorithm. K-nn algorithm is used to find the top k nearest neighbour among all the identified neighbours. It is the simplest machine learning algorithms, an object is classified by a majority vote of its neighbours, with the object being classified by a majority vote of its neighbours. This algorithm is pretty useful as in the real world, most of the practical data does not obey the typical theoretical assumptions made.

A. Advantages of k-nn in application

1. The cost of the learning process is zero.
2. No assumptions about the characteristics of the concepts to learn have to be done.
3. Complex concepts can be learned by local approximation using simple procedures.
4. Provides the nearest hospital and police station list as early as possible.

5.1.2. Police station

After user pressing the button provided in the application, the GPS will be automatically turned on and based on the current location will fetch the details of nearby police station. Also user can choose the police station and register the complaint. Then it generates the FIR and sends a copy to the hospital.

5.1.3. Hospital

After receiving the request, the hospital members scan the QR-code of the user and can start treating the injured person at the earliest time possible

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5.1.4. QR-Code

QR-Code contains all the information of the user. It gets generated at the time of registration with the system. Hospital scans the QR-Code to get the user information and after scanning QR-Code, the alert message which contains the current location of the user is sent to the emergency contact number which the user had registered during the registration process.

The associated algorithm used in this module is the AES algorithm. AES algorithm is better than other algorithms as it is a symmetric block cipher chosen by the U.S. government to protect classified information and is implemented in software and hardware throughout the world to encrypt sensitive data. It is used in order to protect data against unauthorised access and to encrypt this. Symmetric (also known as secret-key) ciphers use the same key for encrypting and decrypting, so the sender and the receiver must both know and use the same secret key.

VI. CONCLUSION AND FUTURE SCOPE

6.1. Conclusion

The application developed is able to correctly complete its purpose within a short time period at the time of accident. Results show that the total time required to perform all the tasks, including the delivery of an SMS with the accident details, followed by providing the nearby police station and hospital details and sending them an alert message about the user accident with exact location of the user, is done in a reasonable shorter period.

6.2. Future scope

In future, the design can be used as a navigation system which can navigate throughout the city. The design can be used to track the location of the injured person while travelling to the hospital. Also some features can be added to keep updated about the injured person to the registered/authorized friends or family.

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